

Claims

- [1] A control device for individually controlling plural circuit-units using a single cable, comprising:
 - a central unit for transmitting frequency signals of different frequency channels; plural circuit-units each provided with a band pass filter having a frequency band different from those of any other band pass filters provided for the other circuit-units; and
 - a cable connected between the central unit and the plural circuit-units to transfer the frequency signals from the central unit to the plural circuit-units.
- [2] A control device as claimed in claim 1, wherein each of the band passes filters has a voltage threshold circuit.
- [3] A control device as claimed in claim 2, wherein the voltage threshold circuit has a diode section, in which at least one forward diode and at least one reverse diode are connected in parallel to each other.
- [4] A control device as claimed in claim 1, wherein each of the band pass filters has a detection unit for detecting an AM signal if a signal passing through the corresponding band pass filter is an AM signal.
- [5] A control device as claimed in claim 4, wherein the detection unit comprises at least one diode, which serves as a voltage threshold circuit for providing a voltage threshold value for the corresponding band pass filter.
- [6] A control device as claimed in claim 1, wherein the cable comprises a frequency signal output line for outputting a frequency signal, a ground line, and a return line, wherein amongst the frequency channels, the highest frequency channel is transmitted to the return line.
- [7] A control device as claimed in claim 1, wherein the central unit divides time into time periods assigned to the different frequency channels and sequentially transmits the frequency signals through the different frequency channels according to the divided time periods.
- [8] A control device as claimed in claim 1, wherein the central unit overlappingly and simultaneously transmits the frequency signals to the plural circuit-units through different frequency channels.
- [9] A control device as claimed in any of claims 1 to 8, the cable is connected with an existing power line so that electric power and the frequency signals are transmitted through the power line.

- [10] A control device as claimed in claim 9, wherein a switch section controlled by the central unit is included in the midway of the power line in the case in which the cable is connected to the power line.
- [11] A control device as claimed in claims 1 to 8, wherein the central unit sends only one frequency value as a frequency signal to be transmitted to a predetermined circuit-unit, and then sends the frequency signal to the predetermined circuit-unit using single resonance only when the frequency value matches with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [12] A control device as claimed in claim 9, wherein the central unit sends only one frequency value as a frequency signal to be transmitted to a predetermined circuit-unit, and then sends the frequency signal to the predetermined circuit-unit using single resonance only when the frequency value matches with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [13] A control device as claimed in any of claims 1 to 8, wherein the central unit sends two or more frequency values as a predetermined frequency signal to be transmitted to a predetermined circuit-unit, and then sends the predetermined frequency signal to the circuit-units using multiple resonance only when all the frequency values match with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [14] A control device as claimed in claim 9, wherein the central unit sends two or more frequency values as a predetermined frequency signal to be transmitted to a predetermined circuit-unit, and then sends the predetermined frequency signal to the circuit-units using multiple resonance only when all the frequency values match with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [15] A control device for individually controlling plural circuit-units using a single cable, comprising:
 - a central unit for transmitting frequency signals of different frequency channels to and receiving signals from circuit-units;
 - plural circuit-units each provided with a band pass filter having a frequency band different from those of any other band pass filters provided for the other circuit-units, wherein each of the circuit-units selectively receives a frequency signal and sends signal information concerning a load included therein to the central unit; and
 - a cable connected between the central unit and the plural circuit-units to transfer

- the frequency signals from the central unit to the plural circuit-units and to transfer the signal information from the plural circuit-units to the central unit.
- [16] A control device as claimed in claim 15, wherein the cable comprises a frequency signal output line for outputting the frequency signals to be transmitted from the central unit to the circuit-units, a ground line, and at least one signal line for transferring signal information from the circuit-units to the central unit.
- [17] A control device as claimed in claim 15, wherein each of the circuit-units comprises a 4-probe method circuit.
- [18] A control device as claimed in claim 15, wherein each of the circuit-units comprises a switch.
- [19] A control device as claimed in any of claims 15 to 18, wherein the central unit sends only one frequency value as a frequency signal to be transmitted to a predetermined circuit-unit, and then sends the frequency signal to the predetermined circuit-unit using single resonance only when the frequency value matches with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [20] A control device as claimed in any of claims 15 to 18, wherein the central unit sends two or more frequency values as a predetermined frequency signal to be transmitted to a predetermined circuit-unit, and then sends the predetermined frequency signal to the circuit-units using multiple resonance only when all the frequency values match with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [21] A method for individually controlling plural circuit-units using a single cable, wherein:
- (a) a central unit transmits, through a cable, frequency signals of different frequency channels to plural circuit-units each provided with a band pass filter having a frequency band different from those of any other band pass filters provided for the other circuit-units;
 - (b) the frequency signals pass through the band pass filters; and
 - (c) at least one of the circuit-units receives a frequency signal passing through the corresponding band pass filter.
- [22] A method as claimed in claim 21, wherein step (b) comprises step of blocking the frequency signals if the voltages of the frequency signals are below a predetermined voltage threshold value so as to improve the cut-off characteristics of

- the band pass filters.
- [23] A method as claimed in claim 22, wherein step (c) comprises step of detecting an AM signal if the frequency signal passing the corresponding band pass filter is an AM signal.
- [24] A method as claimed in claim 21, wherein the cable comprises a frequency signal output line for outputting a frequency signal, a ground line, and a return line, wherein the highest frequency channel is transmitted to the return line through the competition of the frequency channels.
- [25] A method as claimed in claim 21, wherein time is divided into time periods assigned to the different frequency channels and the frequency signals are sequentially transmitted one by one through the different frequency channels according to the divided time periods.
- [26] A method as claimed in claim 21, wherein the frequency signals are overlappingly and simultaneously transmitted to the plural circuit-units through different frequency channels.
- [27] A method as claimed in any of claims 21 to 26, wherein in step (a) the cable is connected with an existing power line so that electric power and the frequency signals are transmitted through the power line.
- [28] A method as claimed in any of claims 21 to 26, wherein in step (a) only one frequency value is sent as a frequency signal to be transmitted to a predetermined circuit-unit, and then the frequency signal is sent to the predetermined circuit-unit using single resonance only when the frequency value matches with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [29] A method as claimed in claim 27, wherein in step (a) only one frequency value is sent as a frequency signal to be transmitted to a predetermined circuit-unit, and then the frequency signal is sent to the predetermined circuit-unit using single resonance only when the frequency value matches with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [30] A method as claimed in any of claims 21 to 26, wherein in step (a) two or more frequency values are sent as a predetermined frequency signal to be transmitted to a predetermined circuit-unit, and then the predetermined frequency signal are sent to the predetermined circuit-unit using multiple resonance only when all the frequency values match with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.

- [31] A method as claimed in claim 27, wherein in step (a) two or more frequency values are sent as a predetermined frequency signal to be transmitted to a predetermined circuit-unit, and then the predetermined frequency signal are sent to the predetermined circuit-unit using multiple resonance only when all the frequency values match with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [32] A method for individually controlling plural circuit-units using a single cable, wherein:
- (a) a central unit transmits, through a cable, frequency signals of different frequency channels to plural circuit-units each provided with a band pass filter having a frequency band different from those of any other band pass filters provided for the other circuit-units;
 - (b) the frequency signals transmitted to the band pass filters;
 - (c) at least one circuit-unit receives a frequency signal passing through corresponding one of the band pass filters; and
 - (d) the at least one circuit-unit transmits an information signal concerning a load included therein to the central unit through the cable connected the central unit.
- [33] A method as claimed in claim 32, wherein in step (d) the circuit-unit selects a signal line for sending the information signal using a switch.
- [34] A method as claimed in claim 32 or 33, wherein in step (a) only one frequency value is sent as a frequency signal to be transmitted to a predetermined circuit-unit, and then the frequency signal is sent to the predetermined circuit-unit using single resonance only when the frequency value matches with a frequency band of a band pass filter corresponding to the predetermined circuit-unit.
- [35] A method as claimed in any of claim 32 or 33, wherein in step (a) two or more frequency values are sent as a predetermined frequency signal to be transmitted to a predetermined circuit-unit, and then the frequency signal is sent to the predetermined circuit-unit using multiple resonance only when all the frequency values match with frequency bands of band pass filters corresponding to the predetermined circuit-units.